IN THE CLAIMS

1. (Currently Amended) An imaging system ~~for imaging an object to an image plane~~, comprising:

an optical arrangement for forming an intermediate image of ~~the~~an object ~~at an intermediate image plane~~ with a first value of axial resolution;

a digital processor configured ~~to process~~for processing the intermediate image to form a final image of the ~~given~~ object ~~at the image plane~~; and

at least one ~~or more~~ specially designed optical ~~elements~~element configured to cooperate with the optical arrangement and the digital processor to define a second value of axial resolution that is greater than the first value.

2. (Currently Amended) The imaging system of Claim 1 wherein the specially designed optical ~~elements are~~element is disposed between the object and the intermediate image ~~plane~~.

3. (Currently Amended) The imaging system of Claim 2, wherein the optical arrangement forms an exit pupil and wherein the specially designed optical ~~elements are~~element is disposed adjacent to the exit pupil.

4. (Currently Amended) The imaging system of Claim 2, wherein the optical arrangement forms an exit pupil and an image of the exit pupil, and wherein the specially designed optical ~~elements are~~element is disposed at the image of the exit pupil.

5. (Currently Amended) The imaging system of Claim 2, wherein the optical arrangement forms an aperture stop and wherein the specially designed optical ~~elements are~~element is disposed adjacent to the aperture stop.

6. (Currently Amended) The imaging system of Claim 2, wherein the optical arrangement forms an aperture stop and an image of said aperture stop ~~at a predetermined location~~, and wherein the specially designed optical ~~elements are~~element is disposed at the ~~predetermined location~~ image of the aperture stop.

7. (Currently Amended) The imaging system of Claim 1, wherein the specially designed optical ~~elements comprise~~element includes a random phase plate.

8. (Currently Amended) The imaging system of Claim 1, wherein the specially designed optical ~~elements comprise~~element includes a pseudo-random phase plate.

9. (Currently Amended) The imaging system of Claim 1, wherein the specially designed optical ~~elements comprises~~element includes a phase grating.

10. (Currently Amended) The imaging system of Claim 1, wherein the specially designed optical ~~elements are~~element is configured to ~~form~~provide a series of sinusoidal functions for modifying a phase function of electromagnetic energy forming the intermediate image.

11. (Currently Amended) The imaging system of Claim 1, wherein the specially designed optical ~~elements comprise~~element includes at least one refractive element.

12. (Currently Amended) The imaging system of Claim 1, wherein the specially designed optical ~~elements comprise~~element includes at least one diffractive element.

13. (Currently Amended) The imaging system of Claim 1, wherein the specially designed optical ~~elements~~element is a single optical element.

14. (Currently Amended) The imaging system of Claim 13, wherein the single optical element ~~comprises one or both~~includes at least one of refractive and diffractive qualities.

15. (Currently Amended) The imaging system of Claim ~~13~~1, wherein the specially designed optical ~~elements comprise one or more~~element includes at least one optical ~~surfaces~~surface.

16. (Currently Amended) The imaging system of Claim ~~13~~15, ~~the~~wherein said at least one optical ~~surfaces~~surface ~~comprising~~includes at least one reflective surface.

17. (Currently Amended) The imaging system of Claim ~~13~~15, ~~the~~wherein said at least one optical ~~surfaces~~surface ~~comprising~~includes at least one diffractive surface.

18. (Currently Amended) The imaging system of Claim 1, the intermediate image having a plurality of frequency components with amplitude characteristics, wherein the specially designed optical ~~elements are~~element is configured for attenuating the amplitude characteristics of certain ones of the plurality of frequency components, and wherein the digital processor ~~being~~is further configured ~~to amplify~~for amplifying the amplitude characteristics of the certain ones of the plurality of frequency components.

19. (Currently Amended) The imaging system of Claim 1, the intermediate image ~~forming~~having a plurality of frequency components with phase characteristics, ~~wherein~~ the specially designed optical ~~elements~~element is configured for perturbing phase characteristics of certain ones of the plurality of frequency components, and wherein the digital processor ~~being~~is further configured ~~to correct~~for correcting perturbed phase characteristics of the certain ones of the plurality of frequency components.

20. (Currently Amended) The imaging system of Claim 1, wherein the optical arrangement ~~forming~~is configured for exhibiting a first depth of field, and wherein the specially designed optical ~~elements~~element and the digital processor ~~cooperating~~are configured to cooperate to ~~form~~yield a second depth of field that is less than the first depth of field.

21. (Currently Amended) In an imaging system ~~for imaging an object to an image plane, the imaging system~~ of the type having an optical arrangement configured to form an intermediate image of ~~the~~an object ~~at an intermediate plane~~ with a first depth of field, ~~further~~an improvement comprising:

~~the improvement of~~ a digital processor configured ~~to process~~for processing the intermediate image to form a final image of the object ~~at the image plane,~~; and

an optical element configured ~~to cooperate~~for cooperating with the optical arrangement and the digital ~~processing~~processor ~~arrangement to~~

~~provide~~such that the combination of said optical arrangement, digital processor and optical element yields a second depth of field that is less than the first depth of field~~ at the intermediate plane~~.

22. (Currently Amended) A method for reducing depth of field of an image of an object, comprising~~ the steps of~~:

forming an intermediate image of the object ~~at an intermediate plane~~ by directing light from said object through at least one ~~or more~~ optical ~~elements defining~~element exhibiting a first depth of field;

perturbing a phase function of ~~electromagnetic energy~~said light forming the intermediate image ~~by~~using a specially designed optical element; and

digitally processing the intermediate image to form a final image such that the ~~one or more~~ optical ~~elements~~element and the specially designed optical element ~~define~~combined yield a second depth of field that is less than the first depth of field.

23. (Currently Amended) The method of Claim 22, ~~the step of~~wherein said perturbing further ~~comprising the step of~~includes positioning the specially designed optical element between the object and the image.

24. (Currently Amended) The method of Claim 23, ~~the step of~~wherein said positioning further ~~comprising the step of positioning~~includes disposing the specially designed optical element adjacent to an exit pupil defined by the ~~one or more~~ optical ~~elements~~element.

25. (Currently Amended) The method of Claim 23, ~~the step of~~wherein said positioning further ~~comprising the step of positioning~~includes disposing the specially designed optical element at an image of an exit pupil defined by the ~~one or more~~ optical ~~elements~~element.

26. (Currently Amended) The method of Claim 23, ~~the step of~~wherein said positioning further ~~comprising the step of positioning~~includes disposing the specially designed optical element adjacent to an aperture stop defined by the ~~one or more~~ optical ~~elements~~element.

27. (Currently Amended) The method of Claim 23, ~~the step of~~wherein said positioning further ~~comprising the step of positioning~~includes disposing the specially designed optical element at an image of an aperture stop defined by the ~~one or more~~ optical ~~elements~~element.

28. (Currently Amended) The method of Claim 22, ~~the step of~~wherein said perturbing further ~~comprising the step of~~includes utilizing a refractive element as the specially designed optical element.

29. (Currently Amended) The method of Claim 22, ~~the step of~~wherein said perturbing further ~~comprising the step of~~includes utilizing a diffractive element as the specially designed optical element.

30. (Currently Amended) The method of Claim 22, ~~the step of~~wherein said perturbing further ~~comprising the step of~~includes utilizing a random phase plate as the specially designed optical element.

31. (Currently Amended) The method of Claim 22, ~~the step of~~wherein said perturbing further ~~comprising the step of~~includes utilizing a pseudo-random phase plate as the specially designed optical element.

32. (Currently Amended) The method of Claim 22, ~~the step of~~wherein said perturbing further ~~comprising the step of~~includes utilizing a phase grating as the specially designed optical element.

33. (Currently Amended) The method of Claim 32, wherein the phase grating exhibits an in-focus point spread function (“PSF”) and an out-of-focus PSF, and wherein ~~the~~said utilizing includes selecting said phase grating ~~is designed such that~~to exhibit an angle between the in-focus PSF and the out-of-focus PSF that is maximized in Hilbert space.

34. (Currently Amended) The method of Claim 22, wherein said forming the intermediate image ~~forming~~includes producing said intermediate image with a plurality of frequency components with amplitude characteristics, ~~the specially designed optical element~~wherein said perturbing includes attenuating the amplitude characteristics of certain ones of said plurality of frequency components, ~~the step~~

~~of~~and wherein said digitally processing further ~~comprising the step of~~includes amplifying the amplitude characteristics.

35. (Currently Amended) The method of Claim 22, wherein said forming the intermediate image ~~forming~~includes producing said intermediate image with a plurality of frequency components with phase characteristics, ~~the specially designed optical element~~wherein said perturbing includes modifying the phase characteristics of certain ones of the plurality of frequency components, ~~the step of~~and wherein said digitally processing further ~~comprising~~includes correcting the ~~perturbed~~modified phase characteristics of the certain ones of said plurality of frequency components.

36. (Currently Amended) An imaging system ~~for imaging an object to an image plane~~, comprising:

an optical arrangement configured to form an intermediate image of ~~the~~an object ~~at an intermediate plane~~, the optical arrangement including one or more optical elements and a specially designed optical element; and

a digital processing arrangement configured to process the intermediate image to form (a) an in focus image of a first axial portion of the object and (b) an out of focus image of a second axial portion of the object.

37. (New) A method for reducing depth of field of an image of an object, comprising:

forming an intermediate image of the object by directing light from said object through at least one optical element exhibiting a first depth of field;

perturbing a phase function of said light forming the intermediate image by using a specially designed optical element; and

digitally processing the intermediate image, including the perturbed phase function, to form a final image such that the optical element and the specially designed optical element combined yield a second depth of field that is less than the first depth of field,

wherein said perturbing further includes utilizing a phase grating as the specially designed optical element,

wherein the phase grating exhibits an in-focus point spread function ("PSF") and an out-of-focus PSF, and wherein said utilizing includes selecting said phase grating to exhibit an angle between the in-focus PSF and the out-of-focus PSF that is maximized in Hilbert space.